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EXAMINER

PARSONS, THOMAS H

ART UNIT

PAPER NUMBER

1745

DATE MAILED: 05/03/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/985,931

Applicant(s)

KOTANI ET AL.

Examiner

Thomas H Parsons

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06 November 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 7 is/are allowed.
- 6) ☒ Claim(s) 1, 2 and 8 is/are rejected.
- 7) ☒ Claim(s) 3-6, 9 and 10 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 06 November 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Specification

1. The disclosure is objected to because of the following informalities:
 - page 2, line 11, suggest changing “by-produced” to --by-product--;
 - page 4, lines 19-20, “...if such uneven temperatures of the surfaces of the reforming catalyst, there...” appears awkwardly worded;
 - line 23, suggest changing “high” to --low--;
 - line 25, suggest changing “low” to --high--;
 - page 5, line 14, suggest changing “burner” to --burners--;
 - line 15, suggest changing “53” to --52--;
 - page 12, line 11-12, “having a plurality of cell laminated” appears awkwardly worded;
 - page 15, line 25, suggest deleting “in”;
 - page 18, line 3, suggest changing “ce111” to --cell 1--;
 - page 19, line 12, before “ECU”, suggest inserting Electronic Control Unit;
 - line 21, suggest changing “form” to --from--;
 - page 27, line 21, suggest deleting “in”;
 - line 25, suggest deleting “is”; and,
 - line 26, suggest changing “come” to --comes--.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 3 and 9 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 3 recites the limitation "said second air introduction member" in line 2. There is insufficient antecedent basis for this limitation in the claim.

Claim 9 recites the limitation "second air introduction member" in line 3. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claims 1, 2 and 8 are rejected under 35 U.S.C. 102(e) as being anticipated by Andou et al. (6,638,653)

The applied reference has a common inventor with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art under 35 U.S.C.

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102(e). This rejection under 35 U.S.C. 102(e) might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not the invention "by another," or by an appropriate showing under 37 CFR 1.131.

Claim 1: Andou et al. in Figure 1 disclose a fuel cell system (FCS) comprising: a fuel cell (1) in which fuel gas and oxidant gas are supplied to generate power;

an evaporator (2) which evaporates raw fuel liquid by a combustion heat obtained by combusting (2c) exhaust gas (7) exhausted from the fuel cell to provide raw fuel gas (col. 3: 55-col. 4: 4); and

a reformer (3) which reforms the raw fuel gas supplied from the evaporator to provide the fuel gas (col. 4: 5-16);

the fuel cell system further comprising:

an air introduction member which introduces air for use in the reforming reaction in the reformer; and the air introduced from the air introduction member being supplied from the evaporator to the reformer (col. 4: 23-32).

Claim 2: The recitation "where said air introduction member introduces the air at the time of starting said fuel cell system" has been construed as a process limitation that does not further limit the overall physical structure of the fuel cell.

Claim 8: Andou et al. on col. 4: 66-col. 5: 2 disclose a flow control valve for controlling the flow rate of air to the evaporator. The Examiner has construed this flow control valve as an air introduction port.

Allowable Subject Matter

6. Claims 3-6 and 9-10 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.
7. Claim 7 is allowable over the prior art of record.

Reasons for Indicating Allowable Subject Matter

8. The following is a statement of reasons for the indication of allowable subject matter:

U.S. Patent No. 6,165,633 issued to Negishi on 26 December 2000 discloses in Figure 1 a fuel cell system comprising temperature sensors for signaling the evaporator temperature wherein a signal output is received at a control unit which determines the internal state of the evaporator based on this input signals, and drives pumps to regulate quantities of methanol and water supplied to the evaporator and thereby regulating the temperature of the raw fuel gas vaporized in the evaporator (col. 15: 56-67).

Negishi further discloses an additional temperature sensor for signaling the reformer temperature wherein a signal output is received at a control unit which determines the reaction temperature in the reformer based on this input signal, and drives a flow regulator to regulate the amount of air fed to the reformer (col. 16: 10-24).

JP2000-340246 in Figure 1 discloses a fuel cell system comprising a thermometer for detecting the temperature of the evaporator, a thermometer for detecting the temperature of the reformer, and a thermometer for detecting the temperature of the reformed gas. These three thermometers are connected to a control section. Based on temperature readings, the controller

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outputs signals to first and second fuel injection equipment to thereby adjust the mole ratio of water to original fuel of water fuel mixed gas.

In contrast, the claimed invention is directed toward a fuel cell comprises a signal for the evaporator temperature based on the temperature of the evaporator and a signal for the temperature of the reforming catalyst based on the temperature of the reforming catalyst wherein after air introduction to an evaporator from an air introduction member is started and when the signal exceeds a prescribed level, raw fuel liquid is supplied to the evaporator. At the time of starting the fuel cell system, the evaporator is cool, and the temperature of the reforming catalyst is low. The applicants disclose that air can be introduced into the evaporator prior to the supply of raw fuel liquid at the time of starting up of the fuel cell system. The use of air as a thermal medium makes it possible to rapidly warm up the evaporator and to increase the temperature of the reforming catalyst in the reformer. The air making use of warming up the evaporator is supplied to the reformer in the state where it remains hot. The Applicants in Figure 3 provide comparative data showing the temperature change in the case of introduction of the air into the evaporator and the temperature change on the case of no introduction of air into the evaporator.

The claimed invention is also directed toward a fuel cell comprises a signal for the evaporator temperature based on the temperature of the evaporator and a signal for the temperature of the reforming catalyst based on the temperature of the reforming catalyst wherein after air introduction to an evaporator from a second air introduction member is started and when the signal exceeds a prescribed level, air introduction from a second air introduction member is stopped and raw fuel liquid is supplied to the evaporator. The fuel cell is in a state of normal operation. At the time of starting the fuel cell system, the evaporator is cool, and the temperature

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of the reforming catalyst is low. The applicants disclose that air can be introduced into the evaporator prior to the supply of raw fuel liquid at the time of starting up of the fuel cell system. The use of air as a thermal medium makes it possible to rapidly warm up the evaporator and to increase the temperature of the reforming catalyst in the reformer. The air making use of warming up the evaporator is supplied to the reformer in the state where it remains hot. The Applicants in Figure 3 provide comparative data showing the temperature change in the case of introduction of the air into the evaporator and the temperature change on the case of no introduction of air into the evaporator. Together with and well admixed with the raw fuel gas obtained by evaporating the raw fuel liquid, the air as the reforming air is supplied to the reformer. The reforming air is brought into contact with the reforming catalyst within the reformer to promote the reforming reaction of the raw fuel gas.

The Applicants further disclose that the second air introduction member is configured so as to introduce the air into the evaporator in an amount larger than that of an air introduction member. Specifically, they disclose that it has a diameter larger than air introduction member. The Applicants disclose that if the amount of air for starting is small, the period for starting the evaporator is slow. There is a tendency that the period for starting the evaporator becomes faster according to the increasing amount of air for starting. For this reason, a large amount of air is introduced at the time of starting the fuel cell. The Applicants in Figure 4 show the relation between the amount of air introduced from the second air introduction member is configured so as to introduce the air into the evaporator in an amount larger than that of said air introduction member and the period until the evaporator can be started.

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Accordingly, neither of the prior art references of record, alone or in combination, disclose the claimed structural and functional relationship between an evaporator and a reformer signal, an air introduction member, and raw fuel liquid.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thomas H Parsons whose telephone number is (571) 272-1290. The examiner can normally be reached on M-F (7:00-4:30) First Friday Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Pat Ryan can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Patrick Ryan
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Thomas H Parsons
Examiner
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